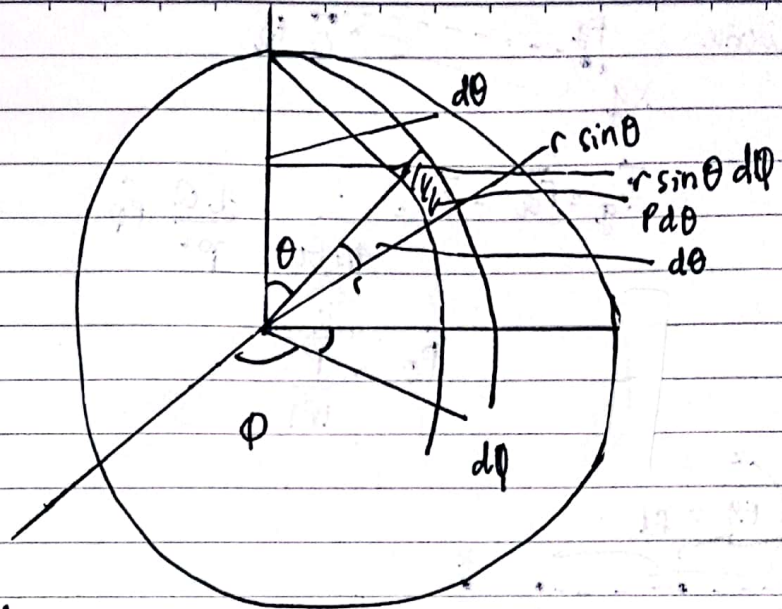
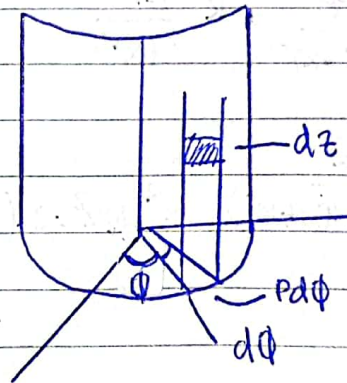


Senin, 04 Maret 2024

Kelistrikan dan Kemagnetan



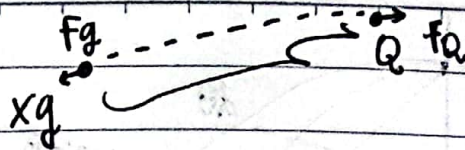
$$\begin{aligned}
 da &= dp \times dl \\
 &= p d\theta \cdot d \sin \theta \phi \\
 &= p^2 \sin \theta d\theta d\phi \\
 d\Gamma &= p^2 \sin \theta d\theta d\phi dp
 \end{aligned}$$



$$\begin{aligned}
 A &= \rho d\phi dz \\
 v &= \rho d\rho dz d\phi
 \end{aligned}$$

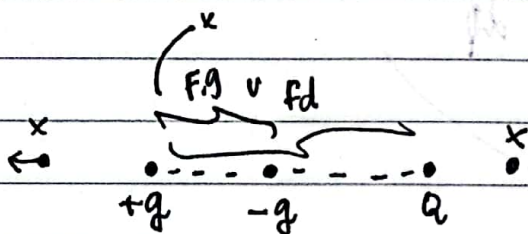
Muatan listrik

$$q = \pm Ne$$



$$\vec{F}_g = \vec{F}_Q = \vec{F} = \frac{1}{4\pi\epsilon_0} \frac{qQ}{r^2} \hat{r}$$

$$\hat{r}_0 = \frac{\vec{r}}{|\vec{r}|}$$

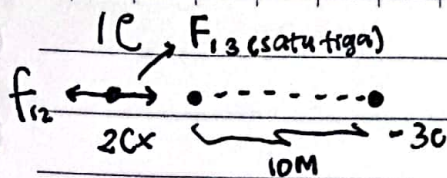


$$Q > q$$

$$-q, \quad q, \quad \vec{F}_{12} = \vec{F}_{21}$$

$$\frac{kqQ}{(r-x)^2} = k \frac{q_1 q}{(x^2)}$$

$$\frac{Q}{(r^2 - 2rx + x^2)} \cdot x^2 Qx^2 = 2(P^2 - 2Px + x^2)$$



$$\vec{F} = F_{1,3}$$

$$k \frac{1 \cdot 2}{x^2} = k \frac{1 \cdot 3}{(10+x)^2}$$

$$\frac{2}{x^2} = \frac{3}{x^2 + 20x + 100}$$

$$3x^2 = 2x^2 + 40x + 200$$

$$x^2 - 2x^2 - 40x - 200 = 0$$

$$x^2 - 40x - 200 = 0$$

$$(x - 20)(x - 60)$$

$$f_1 = f_2$$

$$k \frac{q \cdot q}{(r+x)^2} = k \frac{q \cdot q}{(x^2)}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

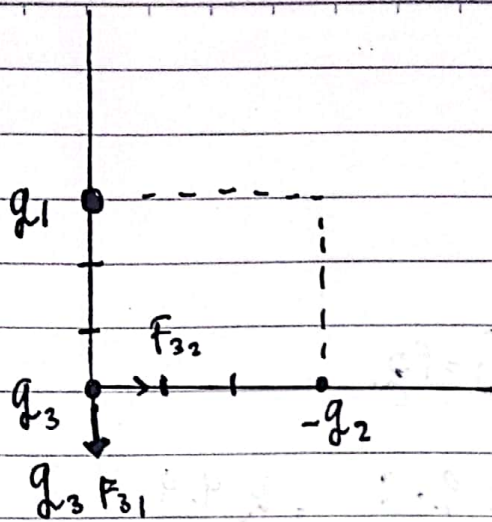
$$= \frac{-(-40) \pm \sqrt{(-40)^2 - 4 \cdot 1 \cdot -200}}{2 \cdot 1}$$

$$= \frac{-40 \pm \sqrt{1600 + 800}}{2}$$

$$= \frac{-40 \pm \sqrt{2400}}{2}$$

$$= \frac{-40 \pm 20}{2} = \frac{-40 - 20}{2}$$

$$= \frac{-60}{2} = -30$$



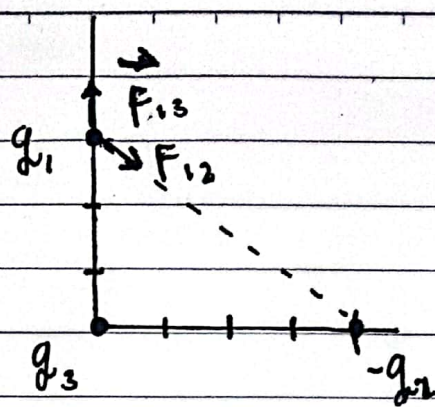
$$\hat{r}_{10} = \frac{\vec{r}}{|\vec{r}|}$$

$$\begin{aligned} \vec{F}_{32} &= k \frac{q_3 \cdot q_2}{4^2} \frac{(3\hat{i} + 0\hat{j})}{\sqrt{3^2 + 0^2}} \\ &= k \frac{q_3 q_2}{16} \hat{i} \end{aligned}$$

$$\vec{F}_{31} = k \frac{q_3 q_1}{3^2} (-\hat{j}) = -k \frac{q_3 q_1}{9} \hat{j}$$

$$\vec{F} = k q_3 \left[\frac{q_2}{16} \hat{i} - \frac{q_1}{9} \hat{j} \right]$$

$$|\vec{F}| = k q_3 \sqrt{\left(\frac{q_2}{16}\right)^2 + \left(\frac{q_1}{9}\right)^2}$$

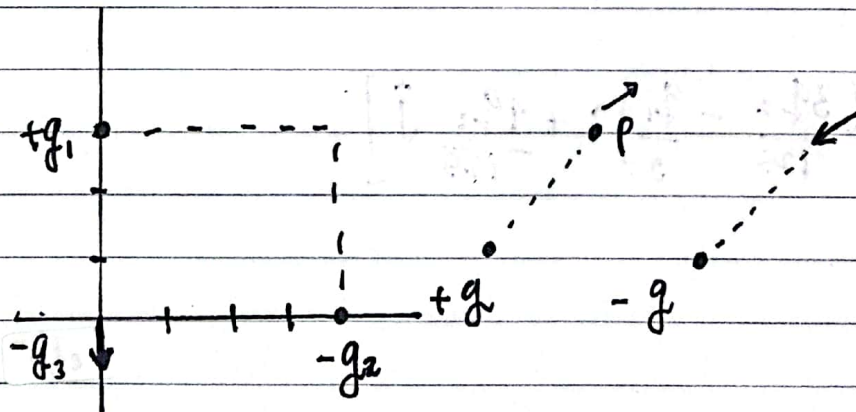


$$\vec{F}_{13} = k \frac{q_1 q_3}{3^2} \hat{j}$$

$$\vec{F}_{12} = k \frac{q_1 q_2}{5^2} (4\hat{i} - 3\hat{j})$$

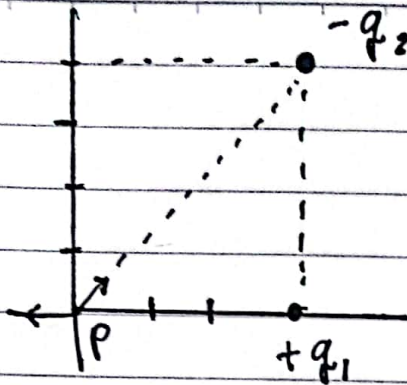
$$= 4k \frac{q_1 q_2}{125} \hat{i} - 3k \frac{q_1 q_2}{125} \hat{j}$$

$$\vec{F} = k q_1 \left[\left(\frac{4q_2}{125} \right) \hat{i} + \left(\frac{q_3}{9} - \frac{3q_2}{125} \right) \hat{j} \right]$$



$$\vec{F}_{q_3} = \vec{E}_{q_3} = \frac{F_{32}}{q_3} = k \frac{q_3 q_2}{r^2}$$

$$F = k \frac{q_1 q_3}{r^2} \hat{r}$$



$$\vec{E} = k \frac{q_1}{3^2} (-\hat{i})$$

$$= k \frac{q_1}{9} \hat{i}$$

$$\vec{E}_2 = k \frac{q_1}{5^2} \left(\frac{3\hat{i} + 4\hat{j}}{5} \right)$$

$$= 3k \frac{q_2}{125} \hat{i} + 4k \frac{q_2}{125} \hat{j}$$

$$\vec{E} = k \left[\left(\frac{3q_2}{125} - \frac{q_1}{9} \right) \hat{i} + \frac{4q_2}{125} \hat{j} \right]$$